

IMPACT OF PARACETAMOL AND ASPIRIN ON GERMINATION OF PADDY SEEDS
(*ORYZA SATIVA L.*)

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Abstract:

Several external and internal factors affect the germination of seeds. Chemical factors like Pharmaceutical industrial effluents and drugs contaminants may also affect seed germination. The Physiologically Active Organic Molecules (PAOMs) like drugs may interact with enzyme of seeds which will play an important role in germination process. The reclaimed water from pharmaceutical industries always contains PAOMs or metabolites of drugs which will interact with seeds of the field that was shown. In the present research impact of Paracetamol and Aspirin on germination of paddy seeds was evaluated by *in vitro* experiment.

Introduction:

Morphological characters of plant are diagnostic for quantitative and qualitative study of physiological changes by exogenous and endogenous modulations. The morphological characters related to plant development include study of plant anatomy and plant physiology. The plants constantly produce new tissues and phytostructures throughout their lifespan from meristem, hence a living plant always has embryonic tissues (Bäurle et al., 2003). This aspect makes plant development differ from animals.

Morphological characteristics related to growth factors have greater attraction for studying the impact of physical factors like light, gravity etc., Growth in the plants is not only account of cell division but also due to cell elongation. Both the things are mediated by specific plant hormones and Plant Growth Regulators (PGRs) (Ross et al., 1983). Usually these PGRs produced endogenously and show their deep impact on plant morphology. Certain exogenous chemical compounds also show significant impact on plant morphology by direct interaction or modulating plant physiology.

Pharmaceutical industrial effluents and drugs contaminants may also affect seed germination. The Physiologically Active Organic Molecules (PAOMs) like drugs may interact with enzyme of seeds which will play an important role in germination process. The reclaimed water from pharmaceutical industries always contains PAOMs or metabolites of drugs which will interact with seeds of the field that was shown. In this context, it is necessary to determine how the germination process will be affected by the pharmaceutical products. The current laboratory experiment was designed to determine the effects of different concentration (01-50 ppm) of Paracetamol and Aspirin on seed germination in paddy (*Oryza sativa.L*).

Materials and Methods:

Dilute solutions of Paracetamol and Aspirin were prepared with 1 ppm, 5ppm, 25ppm and 50ppm using analytical grade distilled water. Seeds of paddy (*Oryza sativa.L*) were sterilized with 0.1% w/v mercuric chloride solution for 5 minutes to remove micro organisms and then washed three times with sterile distilled water. Paddy seeds were spread on each sterilized petri dish lined with blotting paper, and then irrigated with 10ml of the different concentrations of Paracetamol and Aspirin solutions. Each treatment consisted of three replicate plates with ten seeds per plate. Observations were recorded at 24 intervals, the germinated seeds were counted and the number of germinated seeds was expressed as a percentage.

Results and Discussions:

The percentage of germination of paddy plant seeds varied with respect to different concentrations of Paracetamol and Aspirin (Table 1.) The percentage of seed germination decreases as drug concentration increases. The germination was maximum with control seeds and minimum with 50ppm drug solution.

Table 1. Impact of Aspirin and Paracetamol on Seed germination.

Drug Treatment	Concentration (in ppm)	Percentage of Seed germination
Aspirin	01	81.2
Aspirin	02	79.9
Aspirin	05	54.5
Aspirin	10	23.5
Aspirin	25	05.6
Aspirin	50	00.0
Paracetamol	01	78.9
Paracetamol	02	75.8
Paracetamol	05	67.9
Paracetamol	10	37.8
Paracetamol	25	04.5
Paracetamol	50	00.0

The decrease in germination was maximum in case of ASA compared to APAP. This is due to more protein binding capacity of ASA over APAP. The decrease in germination might be due to variation in osmotic pressure of drug solution and denaturing of enzymes involved in germination process by the action of ASA and APAP by the combination of drug and proteins of the enzymes.

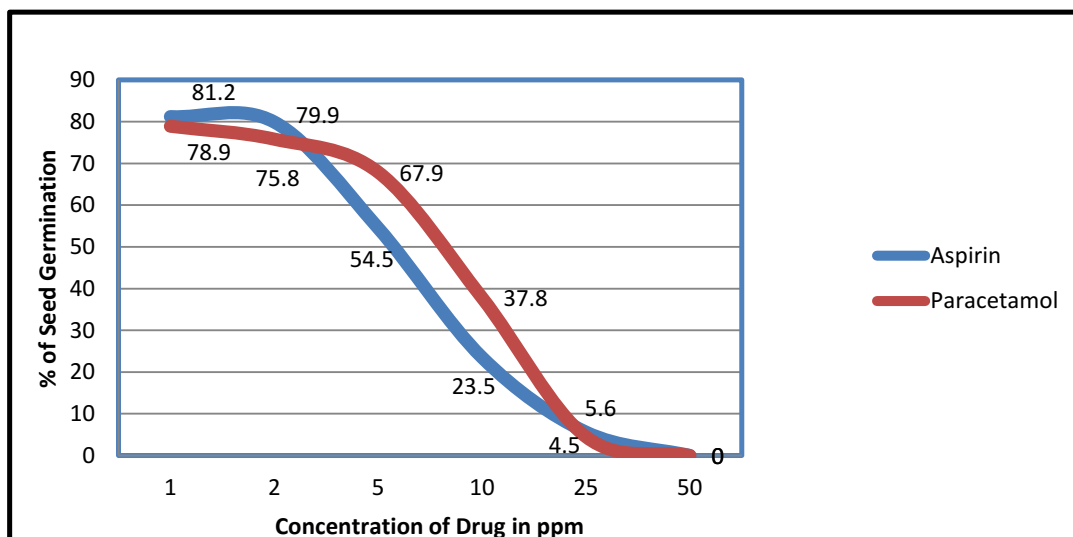


Fig.1. Effect of Aspirin and Paracetamol on Seed germination of Paddy.

Conclusion:

There was mere research concerning the effects of pharmaceutical drugs on plant growth. The current experiment clearly indicated that Aspirin and Paracetamol showed incredible changes in morphological and vegetative parameters of *Oryza sativa L.* in many aspects. This is due to either the interaction of these Physiologically Active Organic Molecules directly with phyto-hormones /Growth Regulators or acts as growth regulators. The above said drugs gradually degraded by soil bacteria and environmental factors into their phenolic monographs (4-amino phenol in case of Paracetamol and Salicylic acid in case of Aspirin) which are more physiologically active as the polarity of functional group increases.

Aspirin and Paracetamol showed considerable impact on seed germination. The gradual decrease in germination of paddy seeds with concentration of Aspirin and Paracetamol, suggests that plants were very sensible to PAOM's. Even in the range of ppm, Aspirin and Paracetamol retards seed germination severely. This experiment reveals that the physiologically active organic molecules (PAOM) like drugs shows significant impact not only on animals but also on plants to various extents.

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